FEDERAL COMMUNICATIONS COMMISSION
Office of Science and Technology
Washington, DC 20554

UNDERSTANDING THE FCC REGULATIONS CONCERNING COMPUTERS

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1.0 INTRODUCTION

This bulletin gives a general overview of the FCC regulations concerning computing equipment. It is intended as a companion to Bulletin OST 52 Interpretations of the FCC Rules for Computing Devices.

The computer rules are incorporated in FCC Rules Part 15. Their purpose is to limit radio emissions emitted by computers and associated devices using digital circuitry in order to minimize the potential for interference to TV and radio communications.

The computer rule making was prompted in part by complaints of interference to TV and radio reception where the source of the interference was identified as some form of computer. Complaints of interference increased even after rules were proposed. To name just a few cases:

--The state police of a western state complained that coin-operated electronic games were causing harmful interference to highway police communications at 42 MHz.

--Purchasers of a popular computer marketed to the general public complained that this computer completely disrupted TV reception in their own and neighbor's homes.

--Interference to aeronautical safety communications at an Eastcoast airport was traced to an electronic cash register in a drug store about one mile from the airport.

As the popularity of computers grew and as more and more computers were put into operation both in the home and in industry, interference from computers became an even greater problem. The National Broadcasting Company found the computer interference problem to be sufficiently significant to warrant a special presentation on TV. This presentation was aired on August 26, 1981.

2.0 BACKGROUND OF COMPUTER RULES

On April 23, 1976, the Commission instituted a rule making proceeding (Docket 20780) to clarify the rules governing restricted radiation devices (including computers) and to provide more realistic limits at VHF and UHF frequencies.

In January 1979, the Commission received a petition from a major computing equipment manufacturer requesting that rules be adopted specifically for computing equipment. The petition asked that more liberal limits be set for such equipment than had been proposed in the 1976 Notice of Proposed Rule Making in Docket 20780. The Commission's response was the First Report and Order in Docket 20780 released October 11, 1979. This Order established limits for computing equipment and an equipment authorization procedure to be effective July 1, 1980.

In response to a number of petitions for reconsideration, particularly of the July 1, 1980 compliance date, the Commission in an Order Granting Reconsideration In Part released April 9, 1980, revised the compliance schedule and made a number of other minor changes to the computer rules. Further revision to the computer rules were made in 1981. Still further proposals to revise these rules are currently pending. A measurement procedure for computing equipment was promulgated in a separate rule making proceeding in Gen. Docket 80-284 with final rules released on March 23, 1981.

See Appendix A for a list of the Orders/Proposals for computing devices.

The computer rules are incorporated in FCC Rules Part 15. Two equipment authorization procedures are used to demonstrate compliance with these rules: certification and verification. See paragraphs 5.1, 5.2 and 5.3 of this bulletin. These procedures are described in FCC Rules Part 2. The procedure to be used with a particular computer or peripheral is given in the computer rules, Part 15 Subpart J. The computer rules do not specify design procedures or set specifications for cabinet or cable shielding, or tell the manufacturer how to build the computer. Nor do the rules specify the performance characteristics of the computer as a computing device or system. The rules impose emission limitations designed to minimize the radio frequency interference potential of the computer. In addition, the rules address the question of a compliance schedule, information to be provided the user on a label and in the instruction book and exemptions from the rules.

3.0 DEFINITIONS

3.1 Computing Device

The Commission considers a computing device to be any electronic device that generates or uses timing signals at a clock rate greater than 10 kHz and uses digital techniques. The precise definition is given in Section 15.4(n). The FCC definition includes all devices that use RF energy for data processing which includes electronic computation, recording, filing, sorting, storage, etc. The definition specifically excludes transmitters, receivers, equipment regulated by Part 18 (ISM equipment) and devices subject to technical standards in other parts of Part 15. See Section 15.4(n).

For regulatory purposes, the FCC has divided computing devices into two categories based on how the computer is marketed and used: Class A and Class B.

3.2 Class A computing device

This is a computer marketed for use in a business/commercial/industrial area. See Section 15.4(o). See 12.0 of this bulletin for a discussion of the FCC restrictions on marketing.

3.3 Class B computing device

This is a computer that is marketed for use in a residential (home) environment. The fact that such a computer is also used in a business does not change the classification. See Section 15.4(p). Examples of Class B computing devices are personal computers such as the Radio Shack, Heath or Apple computers, electronic games for use in the home, teaching computers for use by students at home, electronic organs.

3.4 Peripheral

A computer peripheral is a device that attaches to and is used in conjunction with a computer. The following are examples of peripherals: terminals, modems, printers, memory components, etc.

In general the peripheral takes on the classification of the computer to which it is connected. The Commission is particularly concerned with a peripheral used in the home. It has accordingly defined (Sectin 15.4(s)) a Personal Computer Peripheral as a peripheral capable of connecting to a personal computer via cable. At the same time provision is made in this regulation to classify such a peripheral as a Class A peripheral on a showing by the manufacturer or importer that because of price or performance the peripheral is not suitable for residential or hobbyist use. (A request for such a classification should be made in letter form to the Chairman, Computing Device Panel. See paragraph 11 of this Bulletin.)

3.5 Personal computer

This is a subclass of the Class B computing device. See Section 15.4(q). The distinguishing characteristics of the personal computer are that it uses a standard TV receiver as a display or it meets all the following conditions:

--It is marketed to the general public through a retail store or direct mail order catalog.

--Notices of sale or advertisements are distributed or directed to the general public or the hobbyist and are not restricted to commercial users, (e.g. advertising in newstand magazines as opposed to trade journals).

--It operates on a battery or the 120V electrical supply.

4.0 TECHNICAL STANDARDS

The technical standards for computers regulate both the radiated and power line conducted interference.

4.1 Radiated Interference Limits

The limits for radiated energy from a Class B computer are designed to protect a TV receiver located 10 meters from the computer with at least one wall between the computer and the TV receiver. The FCC found that limiting radiation to the specified level also provided adequate protection for land mobile reception.

For the Class A computer which can be expected to be further from the TV receiver, the radiation limits are relaxed by about 10 dB.

The radiation limits are:

Frequency	Class A from Section 15.810		Class B from Section 15.830
		converted to 3m based on 1/d variation	
MHz	uV/m at 30m	uV/m at 3m	uV/m at 3m
30- 88	30	300	100
88- 216	50	500	150
216-1000	70	700	200

4.2 Conducted limit

The limits for conducted interference are designed to control the amount of RF energy that is emitted by the computing device by conduction over the AC power cord. The limits are a compromise between what is necessary to achieve full protection and what is economically feasible for the computing device. A more liberal limit is provided for a Class A computing device on the grounds that it can be expected to be further from the receiver (typically an AM broadcast receiver) that will suffer interference.

The conduction limits are

Frequency (MHz)	Class A from Section 15.812 (uV)	Class B from Section 15.832 (uV)
0.45-1.6	1000	250
1.6-30	3000	250
Note: Measurements are made across a 50 ohm 50 microhenry LISN. See paragraph 10.0 below.		

5.0 EQUIPMENT AUTHORIZATION REQUIRED

Two equipment authorization procedures are established for computing devices: certification and verification. These methods are not optional for the manufacturer. The procedure to be used is specified in the rules governing the particular computing device. See Sections 15.814 and 15.834. At the present time, certification is mandated only for personal computers, its peripherals and some electronic games. Verification applies to all other computing equipment.

5.1 Certification

Under this procedure the applicant files an application on form 731 with the FCC. Normally, this application is filed by the manufacturer who assumes the responsibility for compliance of the equipment with FCC rules. See Section 2.931. However, other parties, such as an importer or a vendor, may assume the responsibility for compliance and may file the application.

The following material must be attached to the application for certification:

--A detailed report of measurements

--A block diagram of the computing device

--A narrative statement describing how the computing device operates

--The instruction manual furnished to the purchaser. A draft copy may be submitted with the application but must be supplemented with the final document within 90 days.

--Photographs showing the general appearance and component layout of the equipment.

--An engineering drawing or photograph of the proposed equipment identification nameplate. See paragraphs 5.3 and 8.1 of this bulletin.

The application and attachments will be reviewed. If necessary, a sample of the equipment may be requested for a pre-grant sampling test. See Section 2.943. If acceptable, a Grant of Equipment Authorization will be issued. The Grant is an authorization to initiate marketing. See Section 2.803. Certification is described in Part 15 Subpart B and in Part 2 Subpart J.

At present there is no application fee.

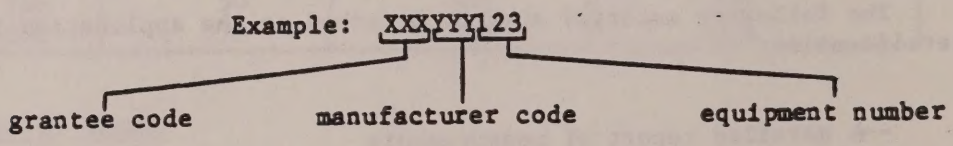
Applications for certification should be mailed directly to the FCC at the following address:

Chief, Authorization & Standards Division
FCC
P.O. Box 429
Columbia, Maryland 21045
Phone 301-725-1585.

5.2 Equipment Identification (FCC ID)

The equipment authorization program requires each certificated computing device to have a nameplate displaying an FCC Identifier and other data in the format established by the Commission. See Sections 2.925-2.926.

The FCC Identifier consists of three elements in the order listed.



(1) Grantee code: A 3-character code assigned by the FCC to identify the grantee (applicant).

(2) Manufacturer code: A 3-character code assigned by the FCC to identify the manufacturer.

(3) Equipment number: A number assigned by the prospective grantee (applicant) to identify the particular device or family of electrically identical devices.

The number assigned shall consist of a series of Arabic numerals, capital letters or a combination therof, and may include punctuation marks and spaces. The total of Arabic numerals, capital letters, punctuation marks and spaces (within the number itself) shall not exceed 11.

The codes for the first two elements may be obtained by submitting a written request, giving the information below, to: Chief, Application Examining Branch, Federal Communications Commission, P.O. Box 429, Columbia, MD 21045. For each type of code required, provide the following information:

GRANTEE CODE: The business name and address of the party who will be identified as the applicant on FCC Form 731. Grantee codes will be sent only to the prospective grantee or an authorized representative.

MFR CODE The complete name and manufacturing address of the manufacturer. If the applicant is not the manufacturer, both name and address must be verified before submitting request to FCC to avoid duplicate codes because of erroneous listing of name. Verification of name and address is especially important where the manufacturer may be foreign.

Where the applicant is also a manufacturer, a code must be requsted for the applicant's use. Where the applicant uses the service of more than one manufacturer, all manufacturer codes should be requested at the same time.

5.3 Verification

Under this procedure the manufacturer or importer tests the computing device to determine that it complies with the applicable FCC technical standards. As soon as he has satisfied himself that the device complies and labels it as required, he may start marketing the device pursuant to Section 2.805. The verification procedure is described in Part 2, Subpart J.

Under verification, no filing with the Commission is required. The Commission may require the manufacturer of equipment subject to verification to submit a report of the measurements that have been made to determine compliance, a sample of the computing device, or both.

No Grant of Equipment Authorization is issued by the Commission for devices subject to verification. Accordingly, NO FCC Identifier or the term "FCC ID" is permitted on the label of verified equipment.

6.0 CHANGES IN COMPUTING DEVICES. DEVICES RETURNED TO THE FACTORY FOR REFURBISHING AND/OR UPGRADING. IMPROVEMENTS TO GRANDFATHERED DEVICES.

6.1 Refurbish only

The computing device is cleaned up, repainted if required, and broken or worn out parts are replaced with identical parts. Such treatment does not affect the status of the computing device. If prior to refurbishing the computing device had required either certification or verification (see 5.1, 5.2 and 5.3), the refurbished device continues to be subject to the same requirement. It must carry the appropriate label and the instruction book must provide the specified information to the user.

6.2 Refurbish and delete option

The computing device is cleaned up, etc. as in 6.1. In addition, one or more optional functions is deleted. A computing device in this category is treated the same as under 6.1.

6.3 Refurbish and modify

The computing device is cleaned up, etc. as in 6.1. In addition, the computing device is modified or one or more new options are added. The regulatory status of the modified device will depend on how it is modified or changed. Each case must be considered individually on its own merits.

Changes in certificated equipment are discussed in Section 2.1043. For verified computing devices, the manufacturer is encouraged to use his own judgement using the general principles set out in Section 2.1043 with regard to changes.

6.4 Improvements to grandfathered devices

Compliance is mandatory for computing devices first placed in production after October 1, 1981. See 7.2. In making changes or improvements to a grandfathered device it is incumbent on the manufacturer to determine whether the improved device retains the grandfathered status or whether the improvements are so extensive that the improved device must be considered a "new product in first production". A modified product identified with a new name or model number would likely be considered a new equipment. Adding an entirely new feature (e.g. disk memory added to a computer terminal) would also place it in the "new" category. Upgrading existing features (e.g. adding one or two extra keys to a keyboard or increasing printer speed) does not necessarily remove the "grandfathered" status.

7.0 COMPLIANCE SCHEDULE

Computing devices must comply with the requirements (technical standards, labelling and others) in the FCC rules in accordance with the compliance schedules set out in Sections 15.814 or 15.834. In addition, the non-interference requirement in Section 15.803 is overriding and applies to ALL computing devices regardless of certification, verification or date of manufacture.

7.1 January 1, 1981

A computing device subject to certification--personal computer and associated peripherals, and electronic games specified by Section 15.834(a)--which has been manufactured since January 1, 1981 is required to be certificated as a prerequisite for legal marketing.

A computing device subject to verification manufactured after January 1, 1981 is required to have a temporary warning label stating it has not been tested for compliance until such time that it has in fact been tested, verified and so labelled. See Section 15.805.

7.2 October 1, 1981

A computing device subject to verification (Section 15.814(a); Section 15.834(b)) which was first placed in production after October 1, 1981 is required to be verified as a prerequisite for legal marketing.

7.3 October 1, 1983

A computing device subject to verification (Section 15.814(b); Section 15.834(c)) which is manufactured after October 1, 1983 regardless of the date of first production must be verified not later than October 1, 1983 as a prerequisite for legal marketing. See 7.1 and 8.2 about the warning label requirement.

7.4 Other Computing Devices

Computing devices manufactured prior to the dates specified in 7.1, 7.2, and 7.3 above, are grandfathered and are subject only to the non-interference requirement of Section 15.803.

8.0 LABELLING REQUIREMENTS

8.1 Compliance label

The labelling requirements for a computing device are set out in Sections 15.805, 15.816 and 15.836. The statement specified in these rules is in

addition to the identification required in other rules: Sections 2.925, 2.926, 2.954 and 2.1045.

With one exception, the label and the wording thereon are mandatory. For a Class B computing device subject to verification, the label and wording thereon are optional. See Section 15.836(c).

The Commission does not specify the size of the label nor the size of the lettering thereon. The only requirement is that the label shall be permanently attached in a conspicuous location and that the text be legible.

8.2 Interim Label (non-tested condition)

If verification is not required until October 1, 1983 and the computing device was manufactured after January 1, 1981, the device must carry the warning label specified in Section 15.805 until such time as the device has been tested and found to comply. This warning label advises the purchaser/user that

--the computing device has not been tested to show compliance with the FCC rules, and

--operation in a residential area is likely to cause unacceptable interference, and

--the purchaser/user is required to take steps to correct the interference.

8.3 Change in Wording on Label

Provision is made for changing the mandatory wording when the Chief Scientist feels the circumstances warrant such action. The request for a change should be submitted as a request for waiver in letter form to the Chief Scientist. The request must be specific as to the change in wording and must be adequately justified. Authority is delegated to the Chief Scientist to act on such requests by paragraph 8 of the Order Clarifying the Rules, Docket 20780, released March 19, 1981 (46 FR 21780, April 14, 1981).

9.0 INFORMATION TO THE USER

9.1 General

The manufacturer or importer is required to furnish information to the purchaser/user about the interference problem. This information must be an integral part of the instruction manual and printed in a conspicuous location in the manual. A separate page inserted loosely into the manual is not acceptable.

APPENDIX A

Appendix A lists the various FCC Orders/Waivers etc. dealing with computing equipment. The last column of this table indicates the Federal Register citation for those documents published in the Federal Register. To a limited extent, individual copies of the Federal Register are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. The Federal Register is also available in many libraries.

Waivers generally are not published in the Federal Register. The citation is to the FCC document file in the FCC Public Information Office.

Copies of these documents can also be obtained at a nominal charge from the FCC duplicating contractor:

Downtown Copy Center
1114-21st St., NW
Washington, DC 20037
202-452-1422

FCC Orders/Waivers, etc. dealing with computing equipment

Docket No.	Title	Date released	Subject	Citation
20780	First Report & Order	10-11-79	Establishes basic rules for computing equipment	44 FR 59530 October 16, 1979
20780	Order Granting in Part Reconsideration	4-9-80	Revises compliance schedule labelling requirements and other changes	45 FR 24154 April 9, 1980
20780	Order Clarifying Rules	3-19-81	Clarified classification of peripherals	46 FR 21780 April 14, 1981
Gen. 80-284	Report and Order	3-23-81	Establishes verification procedure and method of measurement for computing equipment	46 FR 23240 April 24, 1981
Gen. 80-284	Petition for reconsideration pending requests minor changes in measurement procedure.			
Gen. 80-439	Report and Order	3-24-81	Revises exemption from certification for certain electronic games	46 FR 19479 March 31, 1981

APPENDIX A (cont'd)

Docket No.	Title	Date released	Subject	Citation
n. 80-439	Petition for reconsideration pending requests revision of exemption from certification for certain electronic games.			
n. 81-461	Notice of Proposed Rule Making	8-28-81	Proposes an exemption from computer rules for certain medical computers	46 FR 44780 September 9, 1981
n. 81-462	Notice of Proposed Rule Making	8-27-81	Proposes to reclassify coin-operated electronic games as Class A computers	46 FR 44793 September 8, 1981
n. 81-463	Notice of Proposed Rule Making	8-26-81	Proposes to extend exemption from marketing rules for certain computers	46 FR 43709 August 31, 1981
81-216	Notice of Proposed Rule Making	4-10-81	Proposes to revise registration procedure for privately owned PBX and other equipment attached to telephone network	46 FR 22215 April 16, 1981
	Order Granting Waiver	12-10-80	Waives computer rules for Tandy interface devices to be used with older, non complying personal computers. Provides for similar waivers to others.	FCC 80-709
	Order staying 1-1-81 compliance date	12-10-80	Stays compliance date (1-1-81) for coin-operated electronic games	FCC 80-706
	Order waiving Section 15.805	12-11-80	Waives Section 15.805 requirement for a warning label for certain medical computing equipment	FCC 80-707
	Order Granting Waiver	12-9-80	Waives computer requirements for Apple and Heath personal computers. Provides for similar waivers to others	FCC 80-708

APPENDIX B
Extracts from Part 15 (July 1981 edition)
Computing Devices Rules

§ 15.4 General definitions.

(a) *Radio frequency energy.* Electromagnetic energy at any frequency in the radio spectrum between 10 kHz and 3,000,000 MHz.

(b) *Harmful interference.* Any emission, radiation or induction which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunication service operating in accordance with this chapter.

(c) *Incidental radiation device.* A device that radiates radio frequency energy during the course of its operation although the device is not intentionally designed to generate radio frequency energy.

(d) *Restricted radiation device.* A device in which the generation of radio frequency energy is intentionally incorporated into the design and in which the radio frequency energy is conducted along wires or is radiated, exclusive of transmitters which require licensing under other parts of this chapter and exclusive of devices in which the radio frequency energy is used to produce physical, chemical or biological effects in materials and which are regulated under the provisions of Part 18 of this chapter.

(e) *Marketing.* As used in this part, marketing shall include sale or lease, offer for sale or lease, advertising for sale or lease, the import or shipment or other distribution for the purpose of sale or lease or offer for sale or lease.

NOTE.—In the foregoing, sale (or lease) shall mean sale (or lease) to the user or a vendor who in turn sells (or leases) to the user. Sale shall not be construed to apply to devices sold to a second party for manufacture or fabrication into a device which is subsequently sold (or leased) to the user.

(n) *Computing Device.* Any electronic device or system that generates and uses timing signals or pulses at a rate in excess of 10,000 pulses (cycles) per second and uses digital techniques; inclusive of telephone equipment that utilizes digital techniques or any device or system that generates and utilizes radio frequency energy for the purpose of performing data processing functions, such as electronic computations, operations, transformations, recording, filing, sorting, storage, retrieval, or transfer. Radio transmitters, receivers, industrial, scientific and medical equipment and any other radio frequency device which are specifically subject to an emanation requirement elsewhere in this Chapter are excluded from this definition.

NOTE.—Computer terminals and peripherals (i.e. Input/Output devices for computers) which are intended to be connected to a computer are considered computing devices. All other components or subassemblies (e.g., switching power supplies) of a computing device are not included in this definition.

(o) *Class A computing device.* A computing device that is marketed for use in a commercial, industrial or business environment; exclusive of a device which is marketed for use by the general public, or which is intended to be used in the home.

(p) *Class B computing device.* A computing device that is marketed for use in a residential environment notwithstanding use in commercial, business and industrial environments. Examples of such devices include, but are not limited to, electronic games, personal computers, calculators, and similar electronic devices that are marketed for use by the general public.

NOTE.—A manufacturer may also qualify a device intended to be marketed in a commercial, business or industrial environment as a Class B computing device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B computing device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a computing device as a Class B computing device, regardless of its intended use.

(q) *Personal computer.* An electronic computer that is marketed for use in the home, notwithstanding business applications. Such computers are considered Class B computing devices. Computers which use a standard TV receiver as a display device or meet all of the following conditions are considered examples of personal computers:

—Marketed through a retail outlet or direct mail order catalog

—Notices of sale or advertisements are distributed or directed to general public or hobbyist users rather than restricted to commercial users

—Operates on a battery or 120 volt electrical supply.

If the manufacturer can demonstrate that because of price or performance the computer is not suitable for residential or hobbyist use, he may request that the computer be considered to fall outside the scope of this definition for personal computers.

(r) *Peripheral Device.* A self-contained input/output unit of a system that feeds data into a computer and/or receives data from a computer, including, for example, terminals, printers, floppy disc devices, other data storage devices, video monitors, keyboards, and other input/output devices that may or may not contain digital circuitry.

(s) *Personal Computer Peripheral Equipment.* Peripheral equipment capable of connecting to personal computers via cable, and that is marketed for use in residential environments notwithstanding business applications. Such equipment is considered a Class B computing device. Peripherals marketed in the following ways shall be considered personal computer peripheral equipment:

—marketing through a retail outlet or direct mail order catalog

—notices of sale or advertisements are distributed or directed to the general public or hobbyist users rather than restricted to commercial users.

If a manufacturer can demonstrate that because of price or performance a peripheral is not suitable for residential or hobbyist use, he may request that the peripheral be considered to fall outside the scope of this definition. In other words, he may seek a waiver of the rules classifying a peripheral as a Class B computing device.

SUBPART J—COMPUTING DEVICE

§ 15.801 Scope of this subpart.

(a) Computers and similar electronic equipment that use digital techniques generate and use radio frequency (RF) energy for timing and control purposes. Unless proper precautions are taken, some of this RF energy is radiated into space or conducted along the power line (or combination of both) and may cause harmful interference to radio communications. This subpart sets out technical and administrative specifications to reduce the interference potential of such equipment. The devices subject to this subpart are defined in § 15.4(n).

(b) The requirements herein are a precondition for marketing pursuant to 47 U.S.C. 302 and Subpart I of Part 2 of this chapter.

(c) Pending resolution of the proceeding in FCC Docket No. 20780 and related proceedings dealing with restricted radiation and computing devices, the following computing devices remain subject to § 15.808 but are exempt from complying with other requirements of this subpart.

(1) A computing device utilized in any transportation vehicle including motor vehicles and aircraft.

(2) An electronic control or power system utilized by a public utility or in an industrial plant.

(3) Industrial, commercial, and medical test equipment.

(4) Computing device utilized in an appliance, e.g. microwave oven, dishwasher, clothes dryer, etc.

Although not mandatory, it is strongly recommended that manufacturers of these devices endeavor to have such devices meet the limits herein.

§ 15.802 Cross reference.

The provisions of Subparts A and B of this part and Subparts I, J, and K of Part 2 of this chapter shall apply to a computing device or system operating under this subpart.

§ 15.803 Noninterference requirement.

Notwithstanding the compliance with the technical specifications in this Part, the operation of each computing device is subject to the general conditions of § 15.3. The operator of a computing device may be required to stop operating his device upon a finding that the device is causing harmful interference and it is in the public interest to stop operation until the interference problem has been corrected.

§ 15.804 General requirement.

A computing device shall be constructed in accordance with good engineering design and practice. Emanations from the device shall be suppressed as much as is practical, but in no case shall they exceed the levels specified herein for each class of device.

§ 15.805 Interim labelling and information requirements for non-complying devices.

(a) A Class A or Class B computing device manufactured after January 1, 1981, which has not been verified by the manufacturer as complying with the specifications of this Subpart shall:

(1) have permanently attached in a conspicuous location on the device for the user to observe a label with the following statements:

> This equipment has not been tested to show compliance with new FCC Rules (47 CFR Part 15) designed to limit interference to radio and TV reception. Operation of this equipment in a residential area is likely to cause unacceptable interference to radio communication requiring the operator to take whatever steps are necessary to correct the interference.

(2) have in the instruction manual for the device the following information for the user:

> *Warning:* This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. As temporarily permitted by regulation it has not been tested for compliance with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

(b) Prior to the mandatory effective dates for complying with technical requirements, a manufacturer has the option of verifying a computing device as complying with requirements for Class A equipment and attaching the label specified in Section 15.816(a) and providing with instruction materials the information specified in 15.818, or of verifying a computing device as complying with requirements for Class B equipment and attaching the label specified in Section 15.836(c). Prior to the mandatory effective date for complying with technical requirements a manufacturer

of Class B equipment may verify and label that equipment as complying with Class A requirements.

§ 15.810 Class A computing device: radiation limit.

Emanations from a Class A computing device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified in the table below. The method for determining compliance with these limits shall be in accordance with the test procedures in § 15.840.

Frequency (F) (MHz)	Distance (meters)	Field Strength (μV/m)
30 to 88	30	90
88 to 216	30	150
216 to 1000	30	210

NOTES. (1) The tighter limit shall apply at the edge between the two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closest point of any part of the device or system.

(3) F is the frequency in Megahertz of the emission under investigation.

(4) Measurement for compliance with these limits may be made at a closer distance, provided the test results are compared with the limits at 30 meters using the relationship $E_m = Ed(d/30)$ where,

E_m = computed field strength in microvolts per meter at 30 meters.

Ed = measured field strength in microvolts per meter at the distance "d" meters.

d = distance in meters at which the field Ed was measured (less than 30 meters, but greater than or equal to 3 meters)

§ 15.812 Class A computing device: conduction limit.

A Class A computing device which is designed to be connected to a low voltage public utility power line shall limit radio frequency voltage conducted back into the power lines to values below the levels specified in the following table when measured pursuant to § 15.840.

Frequency (MHz):	*Maximum RF line voltage (μV)*
0.45 to 1.6	1000
1.6 to 30	3000

NOTE.—The tighter limit shall apply at the edge between the two frequency bands. Conducted limits in the frequency range of 10 to 450 kHz are under consideration.

§ 15.814 Class A computing device: verification requirement.

(a) A Class A computing device first placed in production after October 1, 1981, shall be verified for compliance with the requirements for a Class A computing device prior to marketing pursuant to Subpart I of Part 2 of this Chapter.

(b) All Class A computing devices manufactured after October 1, 1983, shall be verified for compliance with the requirements for a Class A computing device prior to marketing pursuant to Subpart I of Part 2 of this Chapter.

(c) Certification by the Commission is not required; however, the Commission reserves the right to require additional testing to verify compliance and, if necessary, to require certification by the Commission.

(d) Notwithstanding the above, in the event harmful interference is caused to radio communications, subsequently produced offending units may be required to comply with the technical specifications herein prior to the mandatory effective date.

§ 15.816 Class A computing device: labelling requirement.

(a) Each computing device which has been verified as complying with the Class A limits shall have permanently attached in a conspicuous location for the user to observe a label with the following statement:

> This equipment complies with the requirements in Part 15 of FCC Rules for a Class A computing device. Operation of this equipment in a residential area may cause unacceptable interference to radio and TV reception requiring the operator to take whatever steps are necessary to correct the interference.

(b) For systems incorporating several peripherals (computer input/output devices, terminals, etc.) or computing devices, only one label on the main control unit is necessary. For a peripheral marketed separately, and verified for complying with the limits for a Class A computing device, a label with the following information shall be conspicuously located on the equipment:

> This equipment has been tested with a Class A computing device and has been found to comply with Part 15 of FCC Rules. See instruction manual. Operation in a residential area may cause unacceptable interference to radio and TV reception requiring the operator to take whatever steps are necessary to correct the interference.

§ 15.818 Class A computing device: information to user.

(a) The following warning or similar statement shall be provided in a conspicuous location in the operator's manual so that the user of a Class A computing device is aware of its interference potential. Additional information about corrective measures may also be provided to the user at the manufacturer's option.

> *Warning.*—This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment

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in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

(b) The instruction manual for a Class A computer peripheral which is separately marketed shall also include sufficient information to insure that the complete system is capable of complying with the requirements for a Class A computing device.

§ 15.830 Class B computing device: radiation limit.

All emanations from a Class B computing device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified in the table below, when tested pursuant to the procedures for such a device in § 15.840.

Frequency (F) (MHz)	Distance (meters)	Field strengths (μV/m)
30 to 88	3	100
88 to 216	3	150
216 to 1000	3	200

NOTES.—(1) The tighter limit shall apply at the edge between two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closest point of any part of the device or system.

(3) F is the frequency in Megahertz of the emission under investigation.

§ 15.832 Class B computing device: conduction limit.

A Class B computing device that is designed to be connected to a low voltage public utility power line which is intended to feed electrical power to residential dwellings shall limit radio frequency voltage conducted back into the power lines to not more than 250 microvolts over the frequency range of 450 to 30,000 kHz, when measured pursuant to § 15.840.

§ 15.834 Class B computing device: compliance requirement.

(a) The following categories of Class B computing equipment which are manufactured after January 1, 1981 shall be certificated by the Commission prior to marketing pursuant to Subpart I of Part 2 of this Chapter:

(1) Electronic games (including coin operated games) exclusive of games that meet all the conditions in paragraph (d) of this section.

(2) Personal computers as defined in Section 15.4(q) of this part exclusive of hand held calculators, desk top calculators or digital clocks or watches.

(3) Personal computer peripheral equipment.

(b) A Class B computing device not listed in paragraph (a) of this Section and first placed into production after October 1, 1981 shall be verified for compliance with the requirements for a Class B computing device prior to marketing pursuant to Subpart I of Part 2 of this Chapter.

(c) A Class B computing device not listed in paragraph (a) of this Section and manufactured after October 1, 1983, regardless of date of first production shall be verified for compliance with the requirements for a Class B computing device prior to marketing pursuant to Subpart I of Part 2 of this Chapter.

(d) An electronic game meeting all the criteria listed in this paragraph is exempt from certification by the Commission but must be verified by the manufacturer:

(1) The game is self-contained.

NOTE.—The term self-contained means that the game is built into a single package. The use of a detachable AC adapter does not change the self-contained character of the game.

(2) The game does not use a TV receiver as a display.

(3) The game uses digital logic that generates a clock frequency below 485 kHz.

(e) A desk top calculator or a hand held calculator is not considered to be a personal computer subject to certification by the FCC. Such calculators are considered to be Class B computing devices subject to verification pursuant to the schedules in paragraphs (b) and (c) of this section.

(f) A digital clock or watch is not considered to be a personal computer subject to certification by the FCC. Such a clock or watch is considered to be a Class B computing device subject to verification pursuant to the schedules in paragraphs (b) and (c) of this section.

(g) The procedures for certification and verification are set out in Part 2 Subpart J of this chapter.

(h) Notwithstanding the above, in the event harmful interference is caused to radio communications, subsequently produced offending units may be required to comply with the technical specification herein prior to the mandatory effective date.

(i) For a Class B computing device subject only to verification, the Commission may require the manufacturer to perform additional testing and may require certification by the Commission pursuant to Subpart J of Part 2 of this Chapter, if the device has been found to cause harmful interference.

§ 15.836 Class B computing device: labeling requirements.

(a) A Class B computing device subject to certification by the Commission shall be identified pursuant to § 2.925 et seq of this Chapter. In addition, the label shall include the following statement:

> Certified to comply with Class B limits, Part 15 of FCC Rules. See instructions if interference to radio reception is suspected.

(b) For personal computer systems incorporating several peripherals (computer input/output devices, terminals, etc.) or other computing devices, only one label on the main control unit is required. For a peripheral certificated as complying with the Class B limits and marketed separately, a label with the following information shall be permanently attached and conspicuously located on the equipment:

> Certified to comply with the limits for a Class B computing device pursuant to Subpart J of Part

15 of FCC Rules. See instructions if interference to radio reception is suspected.

(c) For Class B computing devices subject only to verification of compliance by the manufacturer, the following or similar statement is optional:

Complies with the limits for a Class B computing device pursuant to Subpart J of Part 15 of FCC Rules.

§ 15.838 Class B computing device: information to user.

(a) Information shall be provided to the user of a Class B computing device about

The interference potential of the device

Simple measures that can be taken by the user to correct the interference.

This information shall be included in a conspicuous place in the instruction manual. This is not required for an extremely low power, miniature computing device, such as an electronic digital watch.

(b) The following language may be used to provide the required information, but any language that conveys the same meaning and can be understood by an average person without a technical education, may be used.

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient the receiving antenna

Relocate the computer with respect to the receiver

Move the computer away from the receiver

Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems".

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402. Stock No. 004-000-00345-4.

(c) For personal computers the following warning statement shall be conspicuously located in bold letters in the instruction manual:

Warning: This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception."

§ 15.840 Computing device test procedures.

The procedure for testing computing devices is set forth in Appendix A of this Part, *FCC Methods of Measurement of Radio Noise Emissions from Computing Devices*. Tests of computing devices performed by the Commission will follow this prescribed procedure.

9.2 For A Class A Computer/Peripheral

For a Class A computing device the user is cautioned that if the computing device is used in a residential area it is likely to cause interference, in which case the purchaser/user at his own expense will be required to correct the interference. For a Class A computer peripheral sufficient information should be provided to insure that, when attached to a Class A computer, the complete system is capable of complying with the Class A technical standards. See Section 15.814. The wording of the information statement is mandatory and may be changed only in accordance with the procedure described in Section 8.3 above.

9.3 For A Class B Computer/Peripheral

For a Class B computing device, information should be provided about the interference potential of the device and measures that the user can take to correct the interference. The rules suggest a wording that will accomplish this. This wording is not mandatory. Any language can be used that can be understood by a reader without a technical education and conveys the same meaning. The wording suggested by the Commission lists some four actions that can be taken by the user to correct an interference condition. The manufacturer is encouraged to extend this list.

9.4 Interim Warning for Equipment That Has Not Been Tested

Certain computers are not required to be tested for compliance prior to October 1, 1983. These computers must carry the interim label described in paragraph 8.2 above and must have in the instruction manual a warning statement about the interference potential of the computer and cautioning the purchaser/user to use the equipment in accordance with the instruction manual. The warning statement must point out further that if the non-tested computer is used in a residential area it may cause interference in which case the purchaser/user, at his own expense will be required to correct the interference.

9.5 Change in Wording of Information Statement

The provisions of paragraph 8.3 regarding change in wording on the label also apply to the information statements described in paragraphs 9.2, 9.3 and 9.4.

10.0 MEASUREMENT PROCEDURE

Appendix A to Part 15 sets out the measurement procedure that the Commission will use to check compliance of computing devices and associated peripherals with the technical standards for computers. An applicant for certification should use these methods. When testing for verification it is recommended that these same methods be used in so far as possible to provide

reasonable assurance that the manufacturer's measurements will correlate with those made by the Commission during sampling testing since the Commission's measurements will be made by the procedure in Appendix A to Part 15.

The procedure for radiated measurement specifies that measurements be made on an open field test site using a field strength meter with the detector function set to the CISPR quasi-peak function. Note: CISPR is the acronym for the French name of the Special International Committee on Radio Interference--a special committee of the International Electrotechnical Commission (IEC). CISPR has been studying interference problems since 1934. It has developed standard measuring instruments and standard measurement procedures. ANSI provides USA participation in this work through the United States National Committee of IEC. The FCC measurement procedure calls for the use of a calibrated tuned half-wave dipole with the antenna raised and lowered over a prescribed range of heights.

Conducted measurements are made across a line impedance stabilization network (LISN) in each line. The LISN specified uses a 50 ohm 50 uH circuit. Since this network is relatively new and not generally available, the older, commonly available 50 ohm 5 uH network may be used provided the measurements are corrected according to the curve in Figure 5 of the measurement procedure (Part 15 Appendix A).

Persons making measurements for certification are required by Section 15.38 to file a description of their facilities. In a pending rule making in Docket 21371, the Commission proposed to extend this requirement and shift it to Part 2 Subpart J dealing with the equipment authorization program. As part of the extension, it is proposed that site attenuation measurements be made of the open field test site. Final action in Docket 21371 is expected by September 1982. A list of laboratories which have qualified themselves under Section 15.38 is available from the FCC Consumer Assistance Office, Washington, DC 20554, telephone 202-632-7000.

11.0 COMPUTER DEVICES PANEL

When the computer rules were adopted, the Commission recognized that persons subject to these rules would have questions. To answer these questions in an orderly and consistent manner, a computer devices panel was established. The panel consists of the following FCC staff members:

Mr. L. Art Wall, Chairman
Mr. Julius Knapp
Mr. Charles Cobbs
Mr. Lex Felker
Mr. Dan Yates.

Questions about the FCC computer rules should be addressed to

Chairman, Computing Devices Panel
FCC/OST
Washington, DC 20554
Phone 202-653-8247.

Bulletin OST 52: Interpretations of the FCC Rules for Computing Devices contains interpretations issued by the Panel and is available from the FCC Consumer Assistance Office, Washington, DC 20554, phone 202-632-7000.

Questions dealing only with the details of the measurement procedure for computing devices or of the procedure for filing an application for certification should be addressed to

Chief, Equipment Authorization Branch
FCC
P.O. Box 429
Columbia, Maryland 21045
Phone 301-725-1585.

12.0 MARKETING REGULATIONS

Under authority granted by 47 USC 302, the Commission adopted restrictions on marketing of radio equipment. These rules are in Part 2 Subpart I. Marketing is defined as sale or lease, offer for sale or lease, advertising for sale or lease, importation, or shipment, or other distribution for the purpose of sale or lease or offer for sale or lease.

These rules impose two basic restrictions on the marketing of computing devices. Where the computing device is required to be certificated (personal computer, personal computer peripheral, electronic game) the computer may not be marketed legally prior to the issuance of a grant of certification. Where the computing device is subject to verification, the computer may not be marketed legally until the manufacturer has satisfied himself (by testing) that the computer does in fact comply with the applicable FCC technical standards.

Section 2.806 of these rules provides a limited exemption from the marketing restriction and allows limited operation prior to a determination of compliance. The exemption allows operation at trade shows and for demonstrations to prospective customers. It also allows the operation of large, one of a kind computer systems at the user's premises under specified conditions.

13.0 ENFORCEMENT OF COMPLIANCE

13.1 Spot Checking of Computing Devices

The Commission proposes to enforce the computer rules and associated marketing restrictions by a program of spot checking computing devices on the market. To this end, the Commission reserves the right to request the manufacturer to submit one or more samples of a computing device to the FCC testing facility at Columbia, MD for testing. The pertinent rules are Sections 2.943, 2.945, 2.956, 2.957, 15.37.

13.2 Penalties for Non-Compliance

Penalites for non-compliance of the FCC Rules are set out in Sections 501-504 inclusive of the Communications Act of 1934 as amended, (47 USC 501-504 inclusive).

Section 503 of this Act grants the Commission authority to impose forfeitures on violators of FCC Rules. The procedure for implementing this authority is set out in Section 1.80 of FCC Rules Part 1 (47 CFR 1.80).

14.0 AVAILABILITY OF RULES

Computer rules	Part 15 Subpart J	47 CFR Part 15 Subpart J
Measurement procedure for computers	Part 15 Appendix A	47 CFR Part 15 Subpart J
Marketing rules	Part 2 Subpart I	47 CFR Part 2 Subpart I
Certification/ verification rules	Part 2 Subpart J	47 CFR Part 2 Subpart J
Importation rules	Part 2 Subpart K	47 CFR Part 2 Subpart K
Forfeitures	Part 1 Section 1.80	47 CFR 1.80

Parts 2 and 15 are contained in Volume II of the FCC Rules. Volume II can be purchased from the U.S. Government Printing Office, Washington, DC 20402 at a cost of $23. ($28.75 for foreign delivery.)